RUST GEOTECH INC.

Spectral Gamma-Ray Borehole
Log Data Report

Borehole 51-04-02

Log Event A

Borehole Information

Farm : TX	**Tank :** TX-104	**Site Number :** 299-W15-153
N-Coord : 41,682	**W-Coord :** 76,022	**TOC Elevation :** 670.00
Water Level, ft : 93.8	**Date Drilled :** 4/30/1976	

Casing Record

Type : Steel-welded	Thickness : 0.280	ID, in. : 6
Top Depth, ft. : 0	Bottom Depth, ft. : 100	

Borehole Notes:
This borehole was originally started on December 26, 1973. An 8-in. "starter" casing was driven to a depth of 17.5 ft, where gunite and chicken wire were encountered. The starter casing was pulled and the hole abandoned. Drilling resumed in April 1976 at a slightly different location, with a 20-ft length of 8-in. starter casing, and continued to a depth of 105 ft using 6-in. casing. The pipe was pulled back to the completion depth of 100 ft and the interval between 100 and 105 ft was filled with grout. The 8-in. starter casing was removed and 71 gal of grout was injected into the annulus between the 6-in. permanent casing and the 8-in. borehole wall. There is no mention in the drilling log of the casing being perforated.

The top of the borehole casing is 0.2 ft above the surface. The casing thickness is presumed to be 0.280 in., on the basis of published thickness for schedule-40, 6-in. steel tubing.

Equipment Information

Logging System : 1	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 04/1996	**Calibration Reference :** GJPO-HAN-5	**Logging Procedure :** P-GJPO-1783

Log Run Information

Log Run Number : 1	**Log Run Date :** 4/8/1996	**Logging Engineer:** Mike Widdop
Start Depth, ft.: 0.0	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 17.5	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

Log Run Number : 2	**Log Run Date :** 4/9/1996	**Logging Engineer:** Mike Widdop
Start Depth, ft.: 96.3	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 16.5	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

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Analysis Information

Analyst : E.P. Baumgartner

Data Processing Reference : P-GJPO-1787 Analysis Date : 8/11/1996

Analysis Notes :

The logging of this borehole was completed in two runs using the SGLS. The pre- and post-survey field verification spectra met the acceptance criteria established for the peak shape and system efficiency, confirming the SGLS system was operating within specifications. The energy calibration and peak-shape calibration from these verification spectra were used to establish the channel-to-energy parameters used in processing the spectra acquired during the logging operation.

Casing-correction factors for a 0.280-in.-thick steel casing were applied during analysis.

A depth overlap, where data were collected by separate logging runs at the same depth, occurred in this borehole at about 17 ft. The calculated concentrations of the naturally occurring radionuclides K-40 and Th-232, using the separate data sets at the overlapping depth points, were within the statistical uncertainty of the measurements, indicating generally good repeatability of the radionuclide concentration measurements. The concentration of U-238 calculated by the two data sets did not agree within the statistical uncertainty of the measurement because of radon gas entering and departing the borehole between the two logging runs.

Man-made radionuclides Cs-137, Co-60, Sb-125, and processed U-235 and U-238 were detected in significant concentrations at different locations in the borehole. Cs-137 was detected semicontinuously from the surface to 18 ft with the highest concentration level (about 4 pCi/g) at 0.5 ft. Processed U-235 was detected from 45.5 to 46.5 ft with concentration values less than 4 pCi/g. Processed U-238 was detected over a range of depths from 45 to 53.5 ft with a maximum concentration value of about 62 pCi/g. Sb-125 was detected at depths from 45.5 to 46.5 ft. The three Sb-125 concentration values were less than 5 pCi/g. Co-60 was detected from depths of 74.5 to 76 ft. The four Co-60 concentration values in this interval were less than 1 pCi/g.

The K-40 log has a stepwise increase at 48 ft.

Details regarding the interpretation of the data for this borehole are presented in the Tank Summary Data Report for tank TX-104.

Log Plot Notes:

Separate log plots show the man-made (e.g., Cs-137) and the naturally occurring radionuclides (e.g., K-40, U-238, and Th-232). The natural radionuclides can be used for lithologic interpretations. The headings of these plots identify the energy peak for the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainty for the calculated concentrations at the 95-percent confidence level. The MDL is shown by open circles on the plots. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made radionuclides, the naturally occurring radionuclides, the total gamma count derived from the SGLS and a Tank Farms gross gamma log selected from the Tank Farm Gross Gamma Log database. The gross gamma plot displays the latest available digital data with no attempt to adjust the depths to coincide with the SGLS data.